

## DISEASES

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## Editorial Comment

### A Note of Caution

The present conflict has raised new problems in tuberculosis control. With the stripping of hospital staffs, many institutions are faced with the task of attempting to render adequate medical care by making greater demands upon the physicians who have been left to carry the load, or else be faced with the problem of curtailing some of their beds. Neither of these will prove of benefit in the control of tuberculosis.

What meager statistics have come out of the European countries, reveal that there has been a tremendous increase in tuberculosis mortality. This has been due in part to the utilization of beds formerly used for the tuberculous, now being used for the hospitalization of war casualties. Positive sputum tuberculous patients are mingling freely with the well population, and it is needless to say that a new crop of tuberculosis patients will result. In fact, in many countries this has already come about.

In this country, we have enjoyed a steady decline in the mortality rate from tuberculosis. It is going to be the duty of each and every physician to zealously guard against encroachment upon this splendid record. In many states tuberculosis has reached a figure where it would be comparatively safe to state that the disease was well under control. In other states, of course, there is still a high death rate. In those states our efforts should be accelerated even under war conditions. Sufficient physicians should be allocated for the proper care and treatment of the tuberculous and no institution should be allowed

to curtail necessary care or be permitted to close down needed bed capacity.

It is going to be the duty of every physician serving in the armed forces of our country to keep down the rate of tuberculosis morbidity among our soldiers, sailors and marines, and an added responsibility will rest with the physicians in civilian life to maintain the status quo, or if possible, to continue the progress which has been made to date.

I feel deeply indebted to the Illinois Chapter of the American College of Chest Physicians and to my many other friends present here tonight for this splendid tribute.

Jay Arthur Myers, M.D.

### Middle Atlantic States Issue

The November issue of "Diseases of the Chest" will be a special issue of the journal. Material compiled from the states of New Jersey, Pennsylvania, Delaware, Maryland and the District of Columbia will be featured in the November issue. It will be known as the Middle Atlantic States Issue. In addition to scientific articles written by physicians in those states and the District of Columbia, the issue will contain photographs and descriptions of most of the sanatoria in those states and the District of Columbia. This special issue will be another in the series of such issues of the journal which have been published during the past eight years.

R. C. M.

## Control of Negative Pressure Produced by Suction Machine in the Aspiration of Fluid Complicating Artificial Pneumothorax

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One of the most frequent complications of artificial pneumothorax is the development of pleural effusion. Various estimates place its occurrence between 50 per cent and 90 per cent of all patients at some time during their course of artificial pneumothorax therapy. Many of these cases give no symptoms and the presence of fluid is detected only by routine fluoroscopic examinations.

When the amount of the effusion is small, it does not present a serious problem but when the amount is sufficient to produce pressure symptoms on the adjacent structures, it is necessary to consider the removal of some or all of the effusion to relieve these symptoms. The improper removal of the effusion, however, may produce a group of symptoms more severe than those produced by the fluid itself.

In uncontrolled cases the cause of the symptoms after the removal of the effusion is due to the resulting high negative pressure instead of the positive pressure produced by the effusion.

Since the formation of fluid requires days or weeks, the positive pressure is built up gradually and the circulation adjusts itself to the shifting mediastinum. When the fluid is removed, however, its withdrawal is performed in a relatively short time, i.e., minutes as compared to the days or weeks required for the fluid to develop, and its removal may be accompanied by unpleasant and sometimes alarming symptoms if it is not properly controlled.

These symptoms are due to the uncontrolled increase in intrapleural negative pressure which produces a compensatory shift of the adjacent tissues and organs toward the negative pressure side of the thorax. If the shift is rapid, the following symptoms may occur: dyspnoea, cough, pressure in the chest, weakness and signs of circulatory embarrassment with palpitation, cyanosis and shock.

Several or all of these symptoms may develop and will vary in severity with the degree of negative pressure produced, the length of time it persists and the means taken by the operator or the adjacent tissues and organs to compensate for it.

In uncontrolled cases where the aspiration of fluid frequently produces a high negative pressure which is not relieved by the introduction of air, the high negative pressure must be compensated for by the patient in one of several ways or a combination of them, i.e., there is a shift of the mediastinum to the side of the negative pressure; the diaphragm rises; the intercostal spaces decrease; the lung re-expands; or there is a rapid recurrence of fluid. Sometimes the mediastinum, diaphragm and lungs are fixed by thickened pleura or adhesions and cannot help to relieve the negative pressure. The only alternative on the part of the thorax is to produce fluid again as rapidly as possible.

Various methods have been used to remove pleural effusions but the two most common are the hand syringe and the suction machine. Although this paper deals with the controlled use of the suction machine for the aspiration of fluid, the use of the hand syringe (50 cc.) is the method of choice in certain cases and is safer than the suction machine. The hand syringe is a slow, tedious process, however, when a large effusion is present but it is to be recommended for small or encapsulated effusions or when a diagnostic tap is to be made.

Regardless of which method is used, it is necessary to introduce air into the pleural cavity to overcome the partial vacuum or negative pressure which is produced by the withdrawal of the effusion. The amount of air required is usually less than the volume of fluid removed. If the syringe method is preferred, a simple guide is to introduce about

half a syringe full of air for each syringe full of fluid removed.

For large pleural effusions the suction machine is now commonly employed. Although this method is more rapid than the syringe method, it is more dangerous from the standpoint of producing and maintaining a high and rapid increase in negative intrapleural pressure. Because of this danger, the use of the pneumothorax machine will be described as a means of keeping a constant check on the intrapleural pressure and also as a means of introducing air into the pleural space as required.

The patient is first examined fluoroscopically to determine the height of the fluid level and a line drawn on the skin with a wax pencil at this level. The patient is then placed in the sitting position and two areas on the back prepared with antiseptic solution

and novocaine—one area above the fluid level and the other in the 9th or 10th interspace. In the upper area an ordinary pneumothorax needle is inserted, connected with the manometer side of the pneumothorax machine and the fluctuations noted. Although the effusion exerts a positive pressure because of its weight, the pressure readings above the fluid may still be negative on inspiration, or they may be positive. A small cannula is then inserted in the interspace selected for the withdrawal of the fluid. A three-way or T valve adapter is connected between the aspirating needle and the rubber tubing attached to the suction machine. A gallon bottle is connected in the suction line to trap the fluid. The manometer side of the pneumothorax machine is kept open as the suction is applied. (See Fig. 1.)

The fluid should be removed in small quantities (150-250 cc.) at a time and then sufficient air introduced from the pneumothorax machine to bring the pressure to zero. However, if the manometer reads  $-10$  to  $-12$  on inspiration before 150 cc. have been removed, the suction should be temporarily discontinued, the suction broken by admitting air into the suction line through the T valve and air introduced from the pneumothorax machine until the readings are approximately zero. This procedure is repeated until sufficient fluid has been withdrawn.

The introduction of air prevents the unpleasant symptoms and also facilitates the removal of the fluid since it relieves the partial vacuum and thus requires less suction. The quantity of air introduced is usually less than the amount of fluid withdrawn. The actual amount is relatively unimportant. The important factor is to equalize the negative pressure. The final pressure is adjusted to zero after the last portion of fluid is removed.

As long as the aspirating needle remains in the effusion, the negative pressure rises slowly and in proportion to the fluid removed. However, as the fluid level drops there is a point where the aspirating needle enters the air space above the fluid. There is now a sudden withdrawal of the air from the pleural space. The negative pressure shoots up rapidly and the patient usually complains of feeling weak, dyspnoeic and may show signs of shock. These sudden symptoms are due to a rapid mediastinal shift and circulatory

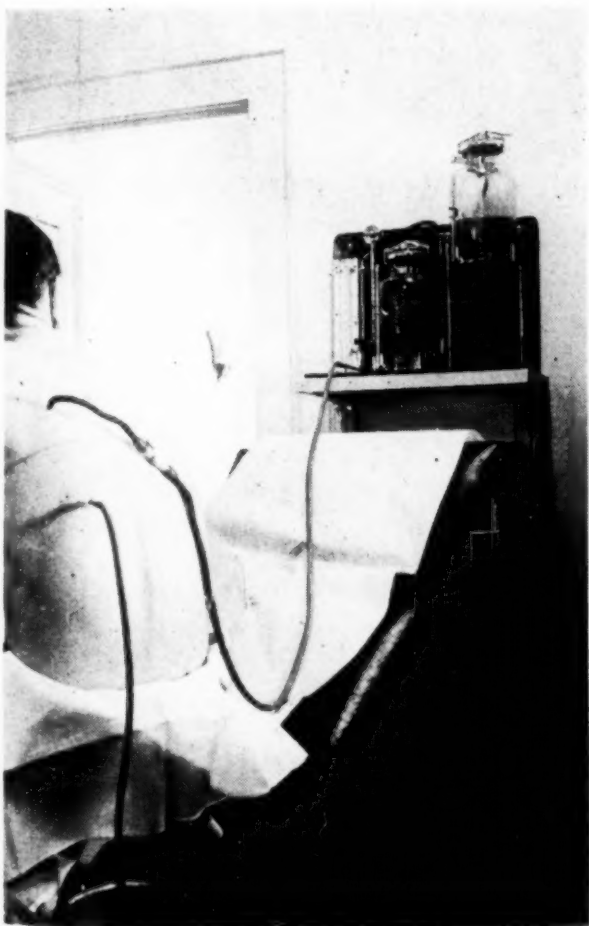


FIGURE 1

*The upper needle is inserted above the line of the fluid level and connected to the pneumothorax machine through a filter-adaptor. The lower needle is inserted in the 10th interspace and the tube is connected to the bottle to trap the fluid in the suction line.*

embarrassment. If the negative pressure is not quickly relieved by the operator, the patient may develop definite signs of circulatory and respiratory embarrassment which may last for several hours or days. These symptoms continue until there is partial re-expansion of the collapsed lung or until sufficient fluid can accumulate to help relieve the mediastinal shift and high negative pressure.

When the fluid level drops below the point of the aspirating needle and the air above the fluid is suddenly withdrawn, the suction should be stopped immediately, the suction broken by admitting air into the suction line through the T valve and sufficient air introduced from the pneumothorax machine to equalize the negative pressure. This is the critical point with most patients and the place where controlled pressure readings are most important. It provides a method for immediately equalizing this rapid rise in negative pressure. If this high negative pressure is not relieved immediately, some or all

of the signs and symptoms previously mentioned will develop.

If it is considered desirable to remove more fluid after the fluid level has dropped below the point of the aspirating needle, the needle can be tipped downward and the patient supported so that he can lean slightly backward, keeping the spine stiff and bending from the hips. Once this critical level has been reached, further aspiration should be continued cautiously. If the fluid level has dropped to the 10th rib posteriorly, it is usually not necessary to completely drain the entire effusion since more fluid frequently develops or the residue becomes absorbed. The final pressure should be adjusted to zero.

Patients who have had their fluid removed by the controlled method feel no ill after-effects and the procedure can be carried out in the office when the proper equipment is available and the patient is ambulatory.

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## Pneumoperitoneum With Phrenic Paralysis

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### *Brief History of Phrenic Paralysis*

The early operative procedures for phrenic paralysis or neurectomy were reported from 1912 to 1922 by Stuert, Bardenhuer, Ochlecher, Sauerbruch, Ralph Matson, Felix, Goetz, John Alexander, and others.

Avulsion, exeresis or permanent paralysis are not so often used as formerly. Most American workers have followed John Alexander and others in merely crushing the nerve and resecting the accessory roots, thus obtaining temporary phrenic paralysis.

*Indications*—Either alone, or more often in combination, it is a valuable procedure in the control of active tuberculosis. Due to subsequent complicating involvement of another lobe or lung and its insufficiency alone as compared with pneumothorax, it is now less used. It is more often indicated in combination with some other form of lung collapse. It aids in lower lobe involvement. It

is sometimes used when pneumothorax is indicated but cannot produce collapse or satisfactory partial collapse, on account of adhesions, even after intrapleural pneumolysis;<sup>1</sup> for economic reasons when pneumothorax cannot be used; in exceptional cases in combination with thoracoplasty; in some cases following pneumothorax; in combination with pneumoperitoneum when pneumoperitoneum is indicated and additional collapse on the most involved side is needed; on the collateral lung instead of bilateral pneumothorax.

*Contra-indications*—It is contra-indicated: (a) when more effective or less radical methods of treatment are applicable without it; (b) in bronchial asthma, emphysema or marked dyspnoea; (c) when it will obviously be inefficient for collapse purposes on account of adhesions, or on account of the extent, location or exudative type of disease;<sup>2</sup> (d) with heart and renal complications. Poor final results and complications arising from later extension of tuberculosis involvement have increased the contra-indications for per-

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manent phrenic paralysis except when definitely and permanently indicated.

Phrenic neurectomy<sup>3</sup> or pneumoperitoneum should be considered next after pneumothorax and pneumolysis, and before more radical collapse measures are contemplated.

### *Pneumoperitoneum*

Pneumoperitoneum has been used since 1902 for diagnostic purposes. Since about 1917 it has been used for intestinal and peritoneal tuberculosis. It is a form of collapse therapy applicable to selected cases of pulmonary tuberculosis, lung abscess and bronchiectasis. It does not produce as complete a degree of collapse as a satisfactory pneumothorax. Ban-yai<sup>4</sup> reported on this subject in 1931, and more recently in 1940.<sup>5</sup> Hobby<sup>6</sup> wrote concerning it in 1938 and Burge<sup>7</sup> published an excellent article in 1938.

*Indications* for artificial pneumoperitoneum in the treatment of pulmonary tuberculosis are as follows:

1) Pneumoperitoneum is indicated in certain cases of bilateral pulmonary tuberculosis too acutely ill or too extensive for bilateral pneumothorax. In cases following an attempt at pneumothorax, or after a phrenic neurectomy, especially if vomiting or definite symptoms of abdominal tuberculosis are present. Pneumoperitoneum may be used in the presence of dyspnoea, marked emphysema or allergic bronchial asthma, as it is controllable, and need not and usually *does* not produce appreciable dyspnoea.

2) If artificial pneumothorax is indicated but cannot be established or made effectual, either pneumoperitoneum or phrenic or both are next considered.

3) Severe hemorrhage not controlled by better means.

4) Following pregnancy.

5) Following reactivation of the tuberculous process after pneumothorax has been discontinued and pneumothorax cannot be re-established.

6) After phrenic nerve paralysis<sup>6</sup> when sputum remains positive and collapse or rise of the diaphragm are insufficient.

7) In bilateral pulmonary tuberculosis complicated by abdominal tuberculosis or basal bronchiectasis.

8) When pneumothorax is disregarded on account of the advanced age of the patient.

9) In addition to pneumothorax in which basal collapse is desired but prevented by adhesions.

10) In addition to pneumothorax when abdominal tuberculosis occurs or persistent vomiting attacks and anorexia, or unexplained abdominal pain develops.

*Contra-indications* are as follows:

1) When satisfactory results can be obtained by available and more orthodox methods of collapse, pneumoperitoneum does not collapse the lung sufficiently to compete with nor supplant them. In pulmonary bilateral cases it may supplement pneumothorax or phrenic paralysis.<sup>6</sup>

2) Generalized tuberculosis.

3) Amyloidosis.

4) Diseases of the aorta and coronary arteries.

5) Cardiac decompensation or myocardial insufficiency.

*Risks or Disadvantages* of pneumoperitoneum which must be controlled or avoided are:

1) The gas or air is absorbed at approximately twice the rate from the abdominal peritoneum as from the unilateral pleura. Refills which at first are given twice weekly, may later be extended to weekly with air and fortnightly with nitrogen.

2) Visceral puncture near adhesions or hemorrhage from vessel puncture.

3) Fluid in the peritoneum may be present or develop later, but does not often persist and seldom interferes with treatment.

4) Less complete collapse of lung is obtained than with satisfactory pneumothorax or thoracoplasty.

5) Tissue or mediastinal emphysema may develop above the diaphragm or within a hernia.

6) Gas embolism may and has occurred. Most careful technique is *imperative*. Peritoneal shock may occur from too sudden distension of the abdomen. Pain in the abdomen may require codeine in some cases after early refills, or discontinuance of pneumoperitoneum.

*Advantages of Pneumoperitoneum* are as follows:

1) The pressures for collapse are controllable.

2) Bilateral or selective collapse in the most diseased area is favored.

3) There is less danger of spontaneous collapse than with pneumothorax.

4) X-ray and physical pulmonary findings are not obscured.

5) More uniform upward pressure under the diaphragm can be made by continuously wearing an elastic abdominal belt between refills.

6) Pneumoperitoneum does not interfere with nor replace the routine diet for abdominal tuberculosis nor calcium therapy nor ultra-violet radiation.

*Physiological Changes* produced are as follows:

1) Lymph stasis and fibrosis are favored.

2) Tissue anoxemia and congestion are less favorable for the growth and spread of aerobic tubercle bacilli.

3) Fifteen to 35 per cent reduction in chest capacity with the decreased vertical length of the lung.

4) Decreased movement and relaxation of tissue around cavities and areas of exudative tuberculosis.

5) Relief of toxemia and vomiting and improvement of or recovery from abdominal symptoms or complications.

6) The psychic effect favors recovery since the patient feels that something is being done.

*The Technique of Pneumoperitoneum* is easily learned by those doing pneumothorax as it is very much the same procedure. Below the diaphragm the absence of negative pressure makes precaution of technique and tactile sense most necessary, in order to know that the blunt needle point is placed just through the parietal peritoneum and not in a tissue or blood vessel. At the initial fill the patient is supine or slightly turned on the right side, with the head and chest and upper abdomen raised at an angle of about 15 to 25 degrees, the stomach empty and the abdomen relaxed.

With strictly aseptic technique, through a 24 to 27 gauge  $1\frac{1}{2}$ -inch needle,  $\frac{1}{2}$  to 2 per cent novocaine (2 to 5 cc.), is injected immediately below the left costal border, just outside the border of the rectus muscle, subcutaneously and nearly to the peritoneum. After puncture of the skin, one may carefully advance the blunt Floyd needle with the water manometer attached to and just through the peritoneum. A few cc. of air is injected. Any undue rise of pressure or pres-

sure pain felt by the patient warns one that the needle point is not correctly placed or that adhesions may be present.

I prefer to use a blunt  $2\frac{1}{2}$ -inch 19 gauge needle on a 5 cc. syringe of novocaine solution ( $\frac{1}{2}$  to 2 per cent), forcing the solution ahead of the needle carefully, feeling and guiding the needle through the tissue layers of the abdomen with the left hand, to and just through the sensitive parietal peritoneum, stopping when the release of pressure is felt, the instant the needle end is through the peritoneum.

Inject the remaining few cc. of novocaine and check for any blood through the needle by slight aspiration. Connect the manometer directly or through a three-way connector. The amount of gas injected depends upon the manometer pressures and upon the feeling of fullness of the patient. After the gas pocket is formed, positive fluctuation may be noted with each inspiration and tympany over the gas pocket or liver. Three hundred, 500, 1,000, 1,500 cc. may be injected at each refill. Pressure should not go above 4 cm. of water at the first injection.<sup>7</sup> The patient should be warned that there will be slight discomfort of the shoulders immediately after the first injection.

Subsequent refills every 2 to 4 days may be increased by 1 cm. of water pressure at each refill up to 9 to 11 cm. Frequent fluoroscopic observations in the upright position and film control are necessary. After the visualization of a definite gas pocket below the diaphragm, one may do the subsequent puncture more conveniently with a short beveled 20 gauge  $2\frac{1}{2}$ -inch rustless needle attached to a 2 cc. syringe of novocaine (2 per cent) solution. Doctor Banyai<sup>5</sup> prefers to give the first injection three fingers breadth below and to the left of the umbilicus. I find that with the firmer support of the rather thin abdominal wall immediately below the left costal border that I can more exactly slowly pierce the peritoneum without plunging suddenly through, and without unfavorable pressure inward upon the underlying viscera.

Oxygen is preferred by some physicians, and is safely and quickly absorbed in case of accidental injection into a vein. Also, it is thought to have a more favorable influence on the tuberculosis of the abdomen.<sup>7</sup> Air is most available. It is absorbed half as quickly

as oxygen. Later refills of air at weekly intervals are more practical for maintaining pneumoperitoneum space and pressures. Nitrogen is advisedly indicated in the presence of febrile peritoneal reactions following refills or of peritoneal fluid.

### *Combined Phrenic Paralysis and Pneumoperitoneum*

The present report is based upon five cases on which the writer performed both procedures during 1938 and 1940.

*Indications*—When one or more of the previously enumerated indications are present for phrenic paralysis or pneumoperitoneum, much additional necessary unilateral collapse may be obtained by combining the two procedures in the following situations:

1) When both lungs are involved and other available forms for needed collapse are considered less suitable and cavitation of the most involved lung is not too rigid nor extensive for probable effective collapse.

2) In essentially unilateral cases after phrenic paralysis, when additional rise of the diaphragm is needed, sputum remains positive and it is expected that closure of cavities and conversion of sputum can be accomplished. The procedure is especially suitable for a persisting basal lesion, or when persistent vomiting is present after left phrenic.

3) With pneumoperitoneum for abdominal symptoms when the worst lung requires additional rise of the diaphragm by phrenic paralysis.<sup>9</sup>

4) A few selected advanced cases,<sup>8</sup> otherwise hopeless, who may respond favorably to pneumoperitoneum or to the combined treatment or may later become amenable to thoracoplasty, or extrapleural pneumothorax, etc. In this group discretion is necessary or treatment may prove to be only palliative or even harmful.

### *Conclusions*

1) Meddlesome or hopeless collapse is condemned and should be avoided. Some failures may be anticipated by the physician but too many will discourage indicated future use of helpful methods of collapse.

2) When phrenic paralysis and pneumoperitoneum are indicated better results will usually be obtained if the phrenic is done first.

3) The simplest effective indicated available methods of collapse should be considered before dangerous radical procedures are contemplated.

4) Pneumoperitoneum and phrenic paralysis may be combined to secure partial, but often sufficient collapse of one or both lungs to produce the best and least deforming end results obtainable in some indicated cases of difficult reactivated or complicated or chronic moderately advanced or advanced pulmonary tuberculosis.

"It is safe to say that the addition of diaphragmatic paralysis doubles the effective (unilateral) collapse possible with pneumoperitoneum."<sup>9</sup> In one case 50 per cent of collapse of the left lung volume was obtained.

"The increasing use of pneumoperitoneum as a method of collapse in individuals in whom pneumothorax cannot be accomplished has opened up a new field for the use of diaphragmatic paralysis."

### *Case Reports*

*Case No. 1041*—Miss H. O., Swedish female, age 18, high school student. Has had contact with two members of her family who had died from pulmonary tuberculosis. Had jaw broken in automobile accident in 1936. Has had cough for several years. Acutely ill for the past six weeks. "Had known she had tuberculosis a long time," but feels utterly helpless and hopeless to combat it. First seen June 10, 1938. Diagnosis: Right lung mixed infiltration hilus and right upper lobe. Progressive rales to 4 d.s. and 2 r. moderately advanced progressive. Left lung exudative pneumonic caseous cavernous, 2 lobes (cavitation 2 to 4 cm.). Rales to 5 r. 6 d.s. Advanced C. rapid-sputum positive, weight 94 pounds. Vertical measurement right 20.5 cm.; left, 22 cm. (Film 1).

Rest dietetic regimen instituted. Hemoglobin 59 per cent, sedimentation rate 28. She denies previous pleurisy. During July, August and September six attempts at pneumothorax failed to find space and no air was injected. July 3, 1938, temperature range 97.4°-100.2°, pulse 80-120. September and October amenorrhea—October abdominal symptoms; persistent vomiting, pain in abdomen with increased temperature. Anorexia, toxemia, loss of weight from 104¼ to 94 pounds.

October 15 to November 15—Thoracoplasty

contra-indicated, too ill, and bilateral involvement. December 1—*Oxyperitoneum begun*, 700 cc., end pressure 4 cm. Some pain in shoulders. Temperature 101° dropped to 99°; on following day rose to 103.2° fourth day. December 7—temperature 101°, oxygen 1,000 cc. Manometer +5½. December 12, oxygen 1,000 cc. Manometer +7.

December 15—Air 100 cc. Manometer +7½. December 22 (S)—Sputum less =15 cc. in 24 hours. January 15, 1939—Much improved, better appetite, feels much better; less toxic. —S=12 cc. Has stopped vomiting since gas, gained some weight. 3.14, S=22 cc. Vertical chest left, 16.5 cm.

March 29—Left temporary phrenic paralysis (palliative) with good increased rise of diaphragm. March 10 film showed increase in cavity at apex. Weight 93½ pounds June 7, 1939 (Film II). August 10—Sputum=2 cc. Pain right caecum, end pressures reduced +9 to +7 to +8 cm. Vertical chest left 13.5 cm. Feels better, increased abdominal pressures only pushed right diaphragm up farther. November 23, 24—Home three days Thanksgiving. S=6 cc. Manometer 9 cm. Sedimentation rate 65, temperature 97.6°-98°, pulse 84-96 undisturbed. January 28, 1940—A little fluid in peritoneum but has continued to improve since March 27, 1940 (Film III). Left chest 135 cm. April 11—S=3 cc. May 9—Diaphragm has descended some. Sputum increased. Cavity still present, left apex.

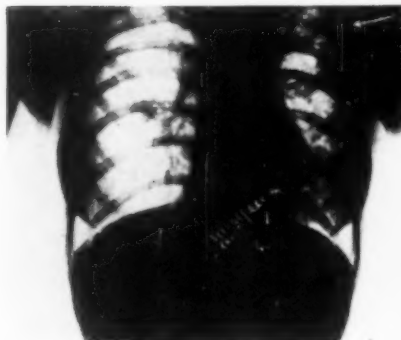
At fourteen months, June 3, 1940—Temporary phrenic (left) repeated. Weight 89¼ pounds. June 6—Good paradoxical movement of the diaphragm raised 1.5 cm. more by second phrenic. Left chest decreased from 22 to 12 cm. in vertical depth or 10 cm. or about 50 per cent plus decrease of volume. July 11—

Home, gained three pounds, to 96¼ pounds. October 2—Appetite good except at menses; some cramps interfere.

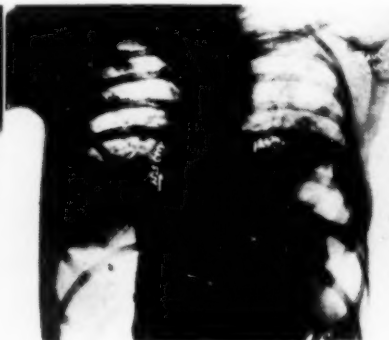
October 9—Sedimentation rate 62 m.m. Eating for a few days. Expectoration in 24 hours equals 0 to 1 cc. December 4, 1940—Cavities all closed, 3 negative 3 day sputums, few rales only after cough, to left 6 d.s. only. January 1, 1941—Prognosis and improvement continues excellent.

Abdominal belt worn previously, had not been worn past two weeks. Reapplied elastic belt. Rales were not found at recent previous examination. Refills every two weeks 500 to 800 cc., manometer end pressures +7 to +8 cm., before fills +5 to +6.5 cm. Patient is allowed finger work, bathroom privileges. Temperature 97.6° to 98°. Premenstrual temperature 99°, weight 88½ pounds. Theoretical standard weight 113 pounds, previous high 105 pounds. Blood pressure 104/74, pp. 30. Sedimentation rate 40. Previously on 12/20/39 was 115 mm. at one hour. Has had 72 refills in two years. Has lost 2½ pounds since 2nd. phrenic. Heart under clavicle on left is raised perceptibly—beat 1st. interspace—less dyspnoea than formerly. I expect gain with increasing physical activity, to gradually decrease abdominal pressure in order to gain weight with present decreased toxemia, now that sputum is absent and negative. Von Bernsdorf Nuclear count 226, October 19, 1940 (Nuclei of 100 polymorphonuclears). Houghton's Index to 166 has risen from a low on 2/22/1939 of 78 then with a low Nuclear count of 185 (Von Bernsdorf). An index of 200 or above is considered a satisfactory normal for discharge in otherwise apparently arrested cases. This is a remarkable improvement in a patient with a previously bad prognosis.

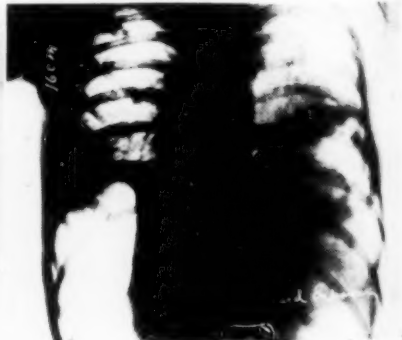
## CASE 1041



Film I



Film II



Film III

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## Pneumothorax

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Pneumothorax is an accumulation of air or gas in the pleural cavity and may be spontaneous or artificial. The latter is the more important, as it is widely and successfully used in the treatment of pulmonary tuberculosis.

Spontaneous pneumothorax is caused by rupture of the lung—thus allowing air to pass into the pleural cavity. There are a number of causes of this condition, but pulmonary tuberculosis is the major cause. Among lesser causes are abscess of lung, empyema, bronchiectasis, wounds and various other causes which weaken the visceral pleura. The cause in some cases is never determined. The symptoms vary from very little disturbance to those of severe shock, and sometimes sudden death occurs before the patient has time to seek medical aid. Usually the symptoms are sudden pain, dyspnoea, rapid pulse, cyanosis and a slight cough. These symptoms vary greatly in intensity. Physical examination reveals an increase in the respiratory rate; the breath sounds are faint or absent and there is a hyperresonant percussion note. If there is an effusion, there will be a shifting dullness in the base. A large opening may produce amphoric breathing. A metallic tinkle can be elicited if there is a complete collapse.

Treatment consists of complete rest in bed, with sedatives when indicated. Normally, the lung will re-expand in one or two months if there is no chronic disease which keeps the opening patent. If there is a valve opening which allows the air to enter but not return, it is usually necessary to insert a catheter and leave it in place to permit escape of air, thus

preventing too high intra-pleural pressure. The needle or catheter is left until there is an adjustment and the valve closes. In tuberculosis it is often desirable to prevent the re-expansion of the lung by artificial pneumothorax. This depends on the individual patient; that is, the amount of involvement in the good lung, the condition of the collapsed lung and other factors.

Sudden collapse of the lung is often the cause of death in lung injuries, such as knife stabs, gunshot wounds, broken ribs, etc. A quick insertion of a needle into the pleural space will many times save the life of such injured persons when it has been determined that the lung is collapsed.

Artificial pneumothorax has been used extensively only in comparatively recent years. Littré, in writing of Hippocrates, stated that Hippocrates had recommended, when a spontaneous pneumothorax occurred, it was sometimes desirable to fill a bladder with air and send it into the chest. Several other writers mentioned this method of treatment. John B. Murphy reported five cases in the late 19th century. Brauer in 1905 published works on pneumothorax and it was given world-wide attention. From that date artificial pneumothorax began to be used therapeutically more or less extensively.

Pneumothorax is the most satisfactory form of collapse therapy. Its mode of action is promotion of rest of the diseased areas. Cavity walls are brought into proximity in successful treatment. The extension of disease is held in check, as is the absorption of toxin. With active disease in the contra-lateral lung,

extreme care must be taken to prevent extension of disease in the uncollapsed lung, as sometimes increased function in the better lung may aggravate the disease. This form of therapy can be discontinued in such cases by withdrawing the air from the pleural space, or allowing it to absorb, if the lung still has the ability to re-expand.

The indications for collapsing the lung by this method vary widely and an individual study of every case is necessary. We do not attempt an initial pneumothorax until the patient has become adjusted to his surroundings and we have made a careful study of the symptoms, x-ray findings, laboratory reports and physical signs in the chest. Of course, in emergencies, such as bleeding or very severe symptoms, the observation period must be omitted and pneumothorax attempted at once. In far-advanced cases, with cavity formation, some form of collapse is indicated as early as feasible, and pneumothorax is the method of choice when possible. When the patient shows noticeable improvement in the observation period and there are no cavities, even though the sputum is positive, we do not hesitate to delay and, when indicated, let rest, fresh air and nourishment heal the diseased lungs, especially when there is no pleurisy, which might cause adhesions and prevent later collapse.

Pneumothorax is used in non-tuberculous disease, but not so widely as in tuberculosis. It has been used as a diagnostic aid in tumors of the lung; also it is sometimes used in pneumonia, but with unsatisfactory results. Sometimes pulmonary abscess is treated in this manner and in about 50 per cent of the cases reported to be satisfactory.

Seldom, if ever, does one see moderately or advanced tuberculosis in one lung without involvement in the other lung. Often the contra-lateral lung will show marked improvement after the collapse of a more diseased lung, in spite of the additional load it is forced to carry. Bleeding is usually an indication for an immediate attempt to collapse the diseased lung. It is often difficult to tell from which lung the blood is coming. Coarse bubbling rales can usually be heard in the lung that is bleeding and often the patient can feel from which side the blood comes.

Bilateral pneumothorax is often of great therapeutic value. In bilateral cavity disease

or in progressive bilateral disease this procedure is often useful. Extreme care in the degree of collapse is necessary and should be checked by physical and by fluoroscopic examination. Variations in the amount of collapse depend on the involvement in the lung on each side. When there is a complete collapse of one lung, it should be allowed to partially expand before attempting to institute collapse therapy in the other side, to safeguard as much as possible against an accidental total collapse by needle puncture or rupture of the lung due to some other cause.

The apparatus used by us is a simple one, made to order, with the minimum amount of valves and gadgets to get out of order. There are different types of machines on the market, but all involve the same principles: A bottle for storing the air or gas and a means of delivering this into the pleural space in measured amounts, connected with a manometer which registers the intra-pleural pressures. The simplest type is where water flows from one bottle into another, displacing air which passes through a rubber tube connected to a needle, the point of which is in free pleural space. The bottles are graduated and in this manner the amount of air displaced can be measured. By reversing the bottles, suction is obtained and a measured amount of air can be withdrawn. We use three needles, a small hyperdermic needle for anesthetizing the skin, a small calibre longer needle for continuing the anesthetization of tissues through the parietal pleura, and the large calibre pneumothorax needle. The latter should be dull for the initial treatment and several thereafter, then a sharp needle is feasible, after the lung is away from the chest wall. We use 2 per cent novocaine and air both for initial and refills.

The technic is simple, but extreme care must be used. The skin is anesthetized after preparation at the site selected, using 2 per cent novocaine, then the larger needle is slowly pushed between the ribs and the anesthetic introduced as the needle is inserted. The feel of the tissues determines the location of the point of the needle so that the operator can usually determine when the parietal pleura is reached. In an initial injection, one must be careful not to puncture the visceral pleura with the sharp-pointed

anesthetic needle. In refills, where the lung is well away from the chest wall, such care is not necessary. The larger needle is now introduced and connected to the apparatus. In the initial injection there should be wide negative oscillations. If there is only a small pocket, the oscillations will be narrow and not so negative, depending on the size of the pocket. A cavity will give oscillations if the needle has punctured the lung, as will the lung. A slight cough will cause a sudden change in pressure when the needle point is in free space. Also a deep breath will cause wide manometer variations. One should under no circumstances introduce air unless the manometer properly oscillates. This precaution will many times save trouble and perhaps prevent an air embolism. Be sure you are in free space before releasing air. We have never had a fatality during pneumothorax injections since the author has been at Cragmor in thousands of treatments over nineteen years. There have been several cases where the patient lost consciousness, but they were revived with no apparent harm. Whenever possible, the patient should be in an institution for the initial injection, with all facilities for any emergency, and a physician unskilled in such work should first, under the observation of an experienced man, give refills, then, still under close observation by his instructor, begin initial injections. Accidents happen with the most experienced and when it happens to one untrained in the danger and precautions, it is a greater tragedy.

The intervals between injections of, and the amount of air vary with each patient. As a rule, we never inject more than 300 cc. with the initial treatment and sometimes even less, then on the following day 2-500 cc., depending on the pressure increase as the air is injected. Refills are then made every 2-4 days for the first week or ten days, then the time is gradually extended according to the rate of absorption and the degree of collapse. As a rule, the longer the patient takes pneumothorax, the slower the absorption, that is, up to several months or a year, when the absorption will usually be at a regular rate. Until the interval between injections and the amount of air have become established, the patient should be examined at specified intervals, both by physical and fluoroscopic examinations.

The intra-pleural pressure should be the minimum that will produce results, that is, keep the diseased part of the lung collapsed. Often a 0 pressure will completely collapse a lung. Too much variation in pressure is not advisable, and when the air is rapidly absorbed the intervals between injections should be shortened to compensate for same. Permitting the lung to partially re-expand should be prevented as far as practical, as it seems to delay healing and promote effusion.

The most serious danger in administering pneumothorax is gas embolism or pleural shock, thought by some to be the same thing, namely, air embolism. This occurs more often in initial treatment, but may occur in refills. Extreme care in withholding air until one is sure that the point of the needle is in free space will help prevent the occurrence of an embolism. We feel that there is less danger of "pleural shock" when one anesthetizes the pleura slowly and well, first with a fine calibre needle. Some men do not use anesthesia in refills and we have had patients who requested that no anesthetic be used. They say that one quick puncture with the large needle is more satisfactory with them than the use of several needles. Pleural shock or embolism may occur suddenly or there may be prodromal symptoms—hypersensitivity to pain during the administration should be watched particularly—then the eyes are usually fixed. The patient is unconscious, or at least unable to speak, and may have muscular movements simulating convulsions.

Marked effusions with serous, or purulent exudate, may be a complication. Empyema occurs more often in long continued pneumothoraxies. Where there is no mixed infection, many time empyema may be treated by the closed method. It may be necessary to establish open drainage by resecting a rib or several ribs.

Extensive uncontrollable disease in the contra-lateral lung may necessitate discontinuance of pneumothorax. Marked cyanosis and dyspnoea may make it advisable to discontinue refills or even to withdraw air, or bilateral pneumothorax may be indicated.

There is no concensus of opinion regarding when pneumothorax should be discontinued. There are wide divergencies of opinion, almost as divergent as who will win the war. The condition of the lung before pneumo-

thorax was started should be carefully studied. We believe that when there was a large cavity or cavities that the pneumothorax should be continued indefinitely, as long as there is no contra-indication. Thick wall cavities many times will not heal even though the collapse has been continued for years. In less extreme disease the patient is advised of the dangers of allowing the lung to re-expand, and also of the danger of long-continued pneumothorax. Then we give him our opinion and let him express his desires in the matter.

In a communication from Dr. T. J. Kinsella of Minneapolis, he states "I am still of the opinion that a considerable number of pneumothoracies which were started for extensive disease for large cavities should never be discontinued. We are seeing more and more patients who come up for thoracoplasty who have given up a perfectly satisfactory pneumothorax sometime before and subsequently reactivated the disease in the original site." In a recent publication, "Artificial Pneumothorax," by Packard, Hayes and Blanchet, the statement is made that "In general it may be stated that the greater the involvement, the longer should the collapse be maintained. Far-advanced disease with cavity formation has, as a rule, been purposely confined by pneumothorax for periods of five or six years, or longer. Most operators advise this length of time." When it has been decided to allow re-expansion of the lung, the condition of the expanding lung should be watched both by x-ray and physical examination, and if signs and symptoms of active disease appears before pleural adhesions prevent it, the lung should be re-collapsed. The patient should continue his daily life under the same conditions he has been under while his lung was collapsed.

Difficulties may arise in the re-expanding side. The lung may fail to re-expand, due to stenosis of main bronchus, thickened pleura with pleural effusion or extensive fibrosis in the lung. As stated above, signs and symptoms of active disease may appear as an old cavity opens. Too often the cavity may seem to be closed until after the lung has been re-expanded and adhered, then it re-opens with all the adverse signs and symptoms. Increasing negative pleural pressure may cause discomfort and shifting of the thoracic organs. The most extreme case ever

seen by us of this shifting mediastinum was that of a man thirty years old who had been taking pneumothorax for ten years for extensive disease of the right lung. Six months previously he had a refill and was told to return in six weeks. He returned to a neighboring state and was not seen for six months. At this time he came back with extreme dyspnoea, and a very rapid pulse, 140-160. He was cyanotic and it seemed that he was near death. Dr. A. M. Forster, whom he had come to consult, advised an attempt to relieve him by injecting air into the pleural space and re-collapse his lung. The apex beat could be felt against the right chest wall. No evidence of free space could be determined by x-ray or physical sign. Dr. Forster stated that he had seen one other similar case in consultation and had advised such a procedure. It was not done and the patient died in a few hours. In the above instance a needle was introduced, marked negative oscillations obtained, air was introduced, the torsion of the thoracic vessels relieved and immediately all the patient's adverse symptoms disappeared. He went his way, stating that he was going to California, and has never returned for further treatment. Such an extreme case is very rare, but it may be necessary to relieve negative pressure by a small amount of air as the lung re-expands. Serous fluid often collects in the pleural space when the lung is re-expanding. It is not necessary to aspirate, and the fluid will gradually absorb. The mediastinum may be displaced toward the collapsed side, pulling the heart toward that side.

In conclusion, it may be said that artificial pneumothorax is a simple procedure, but should be studied in all its phases when a physician gives this type of treatment. He should at all times be careful in his technic and be prepared for treating any complication that may arise. Whenever possible, he should have access to a fluoroscope and it is often advisable to fluoroscope the patient before and after a refill. When a patient is traveling he should be advised of an experienced physician in the locality where he plans to be at the time he is due for a refill. The amount of air given, with opening and closing pressures of several previous refills, should be given him to aid the doctor to whom he is referred. If he contemplates going to a

high altitude, it should not be directly after a refill, but towards the middle or end of the period intervening between refills, or less pressure should be given if a trip to higher altitude is planned soon after a treatment. The patient should consult a physician earlier than usual, to check the condition of

his collapse at this lower altitude. Pressure increases at higher altitudes and if this precaution is not observed, symptoms might arise from increased intra-pleural pressure. In short, individualize every patient and treat him according to his needs.

## Why the Late Entry Into the Sanatorium?

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### *Preface*

Many of the subjects dealt with in this paper are of a controversial nature. Honest differences of opinion are bound to occur. However, it is only by a frank discussion of these same problems that progress can be made.

I should like to express my appreciation in the presentation of this paper to Dr. Earl E. Carpenter and Miss Anne Durbiak.

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There is no one in the field of tuberculosis who does not realize that the greater bulk of patients coming to sanatoria enter in the later stages of the disease. This is proved by the many statistics from tuberculosis hospitals throughout America.

In the State of Wisconsin, a total of 13 sanatoria show that an average of 18 per cent enter in the minimal, whereas 82 per cent come in the moderately and far-advanced stages. Questionnaires were sent to 1,000 patients in the State of Wisconsin by Dr. Earl E. Carpenter, superintendent of the Middle River Sanatorium, and the results of the statistics thus obtained were: 13 per cent minimal, 39 per cent moderately advanced and 48 per cent far advanced on admission.

Koerth et al<sup>1</sup> state that in the Texas State Sanatorium 3.9 per cent are minimal, whereas 76.9 per cent are advanced and 16.5 per cent childhood and non-tuberculous on entrance. Data from other sanatoria corroborate this large percentage of moderately and far-advanced cases throughout this and other countries.

\*Middle River Sanatorium.

The obvious advantages of diagnosing the disease in incipency are:

- 1) Greater possibility of cure.
- 2) Smaller risk of infecting other individuals.
- 3) Lower cost of effecting a cure.

Our problem, briefly, in this paper is an inspection of the reasons for this appallingly late entry and how improvement can be made. Let us examine in some detail the methods of discovering tuberculosis under the present plan:

1) The patient develops symptoms, such as cough, expectoration, fatigue, loss of weight, hemoptysis, pains in the chest, et cetera. He consults his physician, who, being on the alert for pulmonary tuberculosis, proceeds to make physical and laboratory examinations. The findings being sufficient, an x-ray is taken; tuberculosis is discovered; and the patient is soon placed in a sanatorium or kept at home under the watchful eye of the physician.

2) Because of a familial history of tuberculosis and because definite contact with a tuberculous individual has been established, an examination, physical or roentgenologic, is made and the disease found, sometimes with symptoms present and sometimes when they are absent.

3) Through examination of normal individuals by insurance companies, health associations, private physicians and in pre-employment groups and school clinics, so-called "normal individuals" are found to have pulmonary tuberculosis without symptoms.

4) By large scale tuberculin testing of individuals such as school children, contacts, et cetera, x-rays made of the reactors, and

cases of pulmonary tuberculosis are found.

*Diagnosis on Basis of Symptoms and Physical Signs*

Under our present methods, symptoms are the largest single factor in bringing the diagnosis to light. Of our 1,000 patients questioned, 43.5 per cent admitted that symptoms first brought them to the physician; but only 42, less than 10 per cent, entered as minimal cases. Unfortunately, 393 patients did not present any symptoms at all, apparently, until the later stages of the disease were reached. Since only 4.2 per cent of our group of 1,000 were discovered as the result of symptoms while still in the minimal stage, symptoms are, indeed, a poor aid in making early diagnosis.

Steinberg and Barnard,<sup>2</sup> of the Department of Health in the City of New York, give an illuminating study of 717 cases showing typical symptoms of pulmonary tuberculosis, such as severe fatigue, chills, loss of weight, night sweats and local symptoms, such as pain in the chest, cough and expectoration, dyspnea, et cetera. When examined by x-ray, they were neatly divided into three groups. Group number 1, 239 cases, presented no lesions at all. Group number 2, 239 cases, presented non-tuberculous lesions and group number 3, 239 cases, were definitely tuberculous. Symptoms led to a diagnosis of tuberculosis in one case out of three, although typical symptoms were present in all of them. The following table\*\* by these authors shows this comparison:

In examining 1,000 unemployed men by x-ray, Shurly and Brachman<sup>3</sup> found that 2 per cent presented symptoms suggestive of the disease and 70 per cent would have been missed had symptoms been the criteria for discovering the disease, 21 active cases of tuberculosis having been found.

Another factor in this chain of circumstances is the relative inefficiency of the physical examination in determining the presence or absence of pulmonary tuberculosis. Of the 21 cases mentioned above, 52.3 per cent showed no sign of active tuberculosis by physical examination. On our 1,000 questioned cases, 31.5 per cent had a first diagnosis other than pulmonary tuberculosis. This

was not because the physician did not recognize the disease, or was not conscientious in his examination, but occurred because the so-called characteristic signs were not present at the time of examination and the symptoms were absent or so vague as to mislead the diagnostician.

Heise<sup>4</sup> and Brown,<sup>5</sup> examining a large group of individuals, report that rales were present in the following percentages: minimal cases 27 per cent, moderately advanced 75 per cent, far advanced 90 per cent. Obviously the rale is one of the most important single physical signs which can lead us to a diagnosis of early tuberculosis. When a small part of the lung is involved, it is too much to hope that there will be any change in the fremitus and there can be little change in the resonance. The rale, however, has always been the sheet-anchor of physical diagnosis. Observe how readily one might miss a minimal case of tuberculosis by depending on this so-called infallible sign. Seventy-three per cent would be entirely missed until they have reached the far-advanced stage, where in 90 per cent of the cases rales are present and where 90 per cent of the cases also fail to get well.

McMahon and Kerper<sup>6</sup> have shown that 50

COMPARISON OF SYMPTOMS AND DIAGNOSIS OF 717 CASES EXAMINED IN BELLEVUE-YORKVILLE CHEST CONSULTATION CLINIC (1935)

Symptoms	No Lesions*	Non-Tuberculous Lesions	
		Non-Tuberculous Lesions	Tuberculous Lesions
No symptoms . . . . .	40	14	15
<i>General symptoms</i>			
Fever . . . . .	61	67	53
Fatigue . . . . .	131	140	119
Chills . . . . .	51	68	40
Loss of Weight . . . . .	110	121	106
Sweats . . . . .	55	83	57
<i>Local symptoms</i>			
Pain in chest . . . . .	68	83	72
Cough . . . . .	132	195	151
Expectoration . . . . .	99	180	133
Dyspnoea . . . . .	44	87	65
Hemoptysis frank . . . . .	6	5	25
Hemoptysis streaking . . . . .	16	31	31
Gastrointestinal . . . . .	7	10	5
Laryngeal . . . . .	76	100	67
Sputum positive . . . . .	0	0	67
Sputum negative . . . . .	159	187	97
No record of sputum . . . . .	80	52	75
Number of cases analyzed . . . . .	239	239	239

\*\*Reproduced here by permission of Dr. Steinberg and the Editor of the American Review of Tuberculosis.

\*Calcifications at hilum or in lungs present in 26.

per cent of the large cavities and 80 per cent of the small cavities cannot be diagnosed by physical examination because of the lack of physical findings. These can only be seen by x-rays. At Trudeau Sanatorium, in a series of 500 patients with cavities demonstrable by x-ray, only 5 per cent showed the typical signs of cavitation. All of these figures should cause us to stop and realize that by depending on the physical examination we have constructed another loop-hole whereby tuberculosis can slip through the physician's hands. The reasons for these failures in diagnosis by physical examination are many, but a few of them are given as follows:

First, certain set conditions must be present to give definite signs of cavitation. Thick fibrous walled cavities with consolidation surrounding them and with a bronchial communication usually give the typical signs so lovingly demonstrated to the physical diagnosis class. Roentgenologically young, elastic, thin-walled cavities, which are quite common, have no physical signs to demonstrate their presence, can only be diagnosed by x-ray, and have a strange tendency to appear and disappear quite rapidly.

Second, because of the crudeness of diagnosis and the localization of the lesion, it was originally thought that all involvement began at the apex; but it has been shown by Nalbaut and Pinner<sup>7</sup> in a study of 1,000 cases that incipient involvement is very much more likely to occur in the infraclavicular region than in the apical region. It is characterized by its acuteness and tendency to infiltrate rapidly, together with its tendency to excavate early. Early diagnosis in this particular type of lesion is, therefore, important as compared with apical types of involvement, which usually are slow and insidious and do not cavitate until later. However, the infraclavicular involvement, being farther away from the stethoscope, is more difficult to hear because it is surrounded by normal lung tissue overlaid with bone; and it is only with difficulty that anything but normal physical signs are elicited. Rales are also a poor criterion of determining the progress of the disease. They tend to disappear rather rapidly on bed rest. The character and number of rales does not always show the progression or the retrogression of the disease. I have in mind one young man who has had x-rays over a period

of ten years because of the presence of a large number of rales at one apex; yet activity has never been demonstrated during all of this time. It may, therefore, be said that when physical examination is negative the findings must be disregarded for other more trustworthy ones; and the efficiency of the physical examination must be considered questionable, at least in the early diagnosis of the disease.

#### *Diagnosis by Examination of Contacts*

The second method of diagnosing early tuberculosis lies in the x-raying of the contacts of tuberculous patients. By the term "contact" we refer to any individual who has been in more or less close proximity to a patient known to have tuberculosis. The longer and the more intimate the contact, the more likely it is that infection has taken place. This may be a primary infection or the reinfection type of the disease.

Dr. A. A. Pleyte<sup>30</sup> of the Wisconsin Anti-Tuberculosis Association states that in families where multiple deaths from tuberculosis have occurred, 10 per cent of the contacts are found to have reinfection tuberculosis. Families where one death has occurred reveal 4 to 5 per cent of the contacts suffering from the disease, or more than 15 times the amount of disease found in the general population. Compare this with the percentage found in high schools, for instance, in which between 1/10 and 1/3 of 1 per cent are found to have the disease, and it becomes obvious that a greater study of the contacts of known cases will yield profitable results in finding cases early.

Numerous methods are used for studying contacts. When the family physician discovers a case, he makes a determined effort to bring in the contacts and to have them x-rayed. The same procedure is also used by the sanatoria, particularly by the out-patient departments, which, after a list of contacts is made, send out an investigator to round up all of the individuals known to be contacts of the patient. In some cases tuberculin tests are made on the contacts of the patient and then positive reactors x-rayed, whereas in other places all contacts are x-rayed without regard for the tuberculin test. Should anything suspicious be noted, the individual may be permitted to enter the sanatorium for ob-

servation; or he may be allowed to go about his work, and x-rays requested at regular intervals for observation of the lesions.

In a group of 1,333 children<sup>8</sup> under 15 years of age, it was revealed that in homes where sputum positive cases are found 77 per cent of the children had positive tuberculin tests; whereas, in homes where negative sputum cases were found 45 per cent of the children had positive tests.

Weintraub<sup>9</sup> states that in a group of contacts studied, 26 per cent had x-ray evidence of childhood type of involvement, compared with only 10.6 per cent where no definite contact could be established. In a similar group of contacts 24 per cent had x-ray evidence of primary infection, compared with 12.2 per cent in a non-contact group.

Schrempf<sup>10</sup> examined 7,214 school children by the tuberculin test in Germany. He found 1,460, or approximately 20.2 per cent with a positive reaction. In families where definite exposure to tuberculosis has taken place, 89.3 per cent were found to be positive, which gives added emphasis to the figures of Dr. Pleyte, that the disease is 15 times as prevalent in a family where one death occurs from tuberculosis, as in the average family.

Charles Schuman<sup>10</sup> quotes Jessel in stating that among the contacts of 1,035 sputum-positive cases, who were studied for a period of three and one-half years, 153 new cases of pulmonary tuberculosis were discovered. He also states that 205 individuals exposed to positive sputum, 49 or 23.9 per cent contracted the disease, which was contrasted with 115 contacts of negative sputum cases where only 15 or 13 per cent contracted the disease. These statistics clearly reveal a "pay dirt" of high potentialities in finding the disease. Sometimes evidence of contact cannot be established between two cases for many years, but the old slogan, "Every case of tuberculosis comes from another," cannot be questioned.

Other investigators have proved definitely that the amount of infection that occurs is almost a mathematical factor of the length of time that contact was maintained. There is also a definite connection between the seriousness of the disease in the original case, when discovered, and the amount of infection which has occurred in the contact.

Johnson, Howard, Smith and Douglas<sup>11</sup>

have shown that in the twelve year study of 828 children who were contacts, 22 reinfection cases were found, which is much higher than could be expected in an average group of children.

Dr. Plunkett states,<sup>12</sup> "The number of cases found among children under fifteen, examined because of contact or symptoms, was almost negligible. In case finding programs, therefore, greater emphasis must be placed upon securing the examination of adult contacts, even to the exclusion of children, when such a choice has to be made."

#### *Diagnosis by X-ray Surveys*

The third method of locating tuberculosis lies in the examination of large groups of normal individuals. This may be a physical examination, fluoroscopic or x-ray examination. The advocacy of yearly or semi-annual "health examinations" can be a positive factor, provided the physician does not rely on the stethoscope to diagnose pulmonary tuberculosis. Where the opportunity is present, x-rays should be taken. If this is not economically feasible, a fluoroscopic examination of the individual is essential, for if tuberculosis is present in the very early stages, it will quite often be found.

Edwards<sup>13</sup> gives the results of a large number of x-rays taken on individuals desirous of working in the Department of Health, Fire and Education in the City of New York. So far as we know, all of these persons were apparently in good health. Routine x-rays were taken of prospective employees, who were nurses, physicians, dentists, clerks, laboratory workers and laborers. A total of 1,206 x-rays were taken, and 61 or 4.7 per cent were classified as chronic pulmonary tuberculosis. The average ages of these persons were 31.3 years for the male and 29.8 for the female. Inasmuch as many of these individuals were professionally concerned with public health itself, and since most of them were presumably of a fairly high order of intelligence, it seems obvious that, had symptoms been present, it would not have been necessary to take x-rays to reveal the disease.

A group of 5,279 prospective firemen, all adult males averaging between 23 and 29 years of age, were x-rayed. Seventy or 1.3 per cent revealed definite chronic pulmonary tuberculosis. In the Department of Education 3,185

prospective employees were radiographed, 1,660 of whom were male and 1,523 female. Eighty-three cases or 2.6 per cent of the total group were found to have chronic pulmonary tuberculosis. In addition, 1,917 x-rays were taken on applicants who desired to become guides; and 48 cases or 2.5 per cent were found to be actively tuberculous. Considering that one undiscovered case of tuberculosis for which the municipality was responsible might cost the city thousands of dollars, it is obvious that the cost of these 11,687 x-rays is far below the cost of taking care of the 262 cases had they not been discovered prior to employment. This same factor is certainly a strong selling point, not only to various branches of the Government, but also to private industry where breakdown from tuberculosis is frequently a subject in which litigation plays a very important part. Fellows,<sup>2</sup> since 1928, has examined, fluoroscoped and, where necessary, x-rayed the Home Office employees of the Metropolitan Life Insurance Company. In the year 1932, 33 cases were admitted to their sanatorium.

#### *Diagnosis by Tuberculin Surveys*

The fourth and last method of determining the presence of tuberculosis is by the tuberculin test; and until a few years ago, few persons dared to question the veracity of such a simple and inexpensive test as the Mantoux or Von Pirquet test. However, within the last several years a number of investigators have shown that the diagnostic importance of the tuberculin test is questionable.

Long<sup>14</sup> admits that the tuberculin test may show 5 to 10 per cent error.

Dahlstrom<sup>14</sup> examined 2,490 positive reactors, revealing that 276 or 11 per cent became negative at a later period.

Knies<sup>15</sup> examined by the tuberculin test 206 individuals in whom tuberculous infection had been definitely established by x-ray. These individuals ranged in ages from 5 to 75 years, and using the first strength tuberculin he found that 114 of this group were negative. Previous to the test, considerable pressure had been brought to bear through education, interviews, etc., but of these 114 negative cases only 34 returned to take the second strength test. Twenty-one of this group were negative. In a second group of 317 cases, he found that 7 were negative, although x-rays

had revealed minimal exudative infiltration. Knies, therefore, contends that, considering the percentage of the group that failed to return for the second test—and this is a common occurrence—an error of 27 per cent might be chalked up against the test. A variant was discovered in using old tuberculin and PPD; and it was determined that old tuberculin was somewhat more sensitive than PPD, although some individuals reacted positively to one test and negatively to the other.

Crimm<sup>16</sup> reports that in 1,384 cases, 191 or 13.8 per cent reacted negatively, although there was roentgenological evidence of pulmonary tuberculosis.

As recently as January, 1941, Tice<sup>17</sup> reports that 167,345 children were tuberculin tested and that of 27,401 positive reactions only 586 active infections were found, at an estimated cost of \$450 per case. He concludes that "in view of the effort and expenditures and in the face of recent developments, case-finding limited to the school age groups is unproductive and economically contraindicated in large scale work." He apparently feels that x-ray surveys of individuals where there is a high death rate from tuberculosis is of greater value, and that the miniature x-ray will probably take the place of the tuberculin x-ray screening method.

Douglas and Birkelo<sup>18</sup> examined by miniature x-ray and tuberculin-tested 1,425 women. Five cases of tuberculosis were found in this group, 3 of whom reacted positively to the tuberculin and 2 negatively. Had the tuberculin test been used as a criterion, almost half of the cases would have been missed. Musacchio<sup>19</sup> states that in 1,000 cases of pulmonary tuberculosis, the more minimal the lesion the more positive the reaction. In 528 far-advanced cases of pulmonary tuberculosis tested with tuberculin, 17 were non-reacting; or, 78.3 per cent of this entire non-reacting group were in the far-advanced stage.

Here at the Middle River Sanatorium we have tested our patients and found that in the first strength Mantoux test 78 per cent reacted, and that of 46 non-reactors who were given the second strength test, all of the minimal cases, 75 per cent of the moderately advanced and 63.6 per cent of the far-advanced cases reacted. This shows that 36.4 per cent of our far-advanced cases did not react to the second strength tuberculin. The

test was repeated in 1940 with a somewhat higher percentage of reactors. Ten per cent of our entire far-advanced group failed to react to the test.

Robins<sup>20</sup> makes the following statement: "The pre-adolescent child is not a fertile field for case-finding by the mass survey method. A study of 9,500 children, 3 to 16 years of age, investigated by tuberculin test screening and x-ray of the positive reactors, revealed only two cases of reinfection tuberculosis." Many organizations spend a good deal of effort and money attempting to locate active tuberculosis through wholesale tuberculin testing upon thousands and thousands of school children. The positive reactors are proudly x-rayed, a few cases of childhood infection are found, a rare case of adult tuberculosis is seen and many hundreds of thousands of healed childhood tuberculous chests are noted. The next year many of these same children may be re-examined, again to find the same condition prevailing. It is economically unsound to continue this practice indefinitely. In most cases the follow-up only continues for 2 or 3 years at the most and the whole thing is then forgotten. It reminds one of the quotation from Shakespeare: "It is a tale told by an idiot, full of sound and fury, signifying nothing."

Godfrey<sup>21</sup> asserts of the promiscuous tuberculin testing of school children: "I do so only to condemn it as a waste of time, money and effort—at least until the real job has been done. Mass surveys of whatever type must be carefully considered from the standpoint of cost and probable yield. Except for exploratory purposes, they should not interfere with a thorough search among the household contacts."

The obvious disadvantages of tuberculin testing are:

- 1) It is an expensive method of locating pulmonary tuberculosis, as compared with other methods of finding the disease.

- 2) It is inaccurate, as shown by the above statistics.

3. Many parents object to the use of needles on children, which prevents a certain number from consenting to the test.

- 4) If the first strength test has been made the news gets around that there are many sore arms and many parents refuse to have the children subjected to second strength test.

- 5) It leads to false sense of security in those in whom the test is negative. It also leads to an undue amount of alarm in positive reactors, particularly in rural communities where many children have been ostracized because the simple tuberculin test was positive.

In recent years the tuberculin patch test by Vollmer, put out in the form of an inexpensive tape containing controls as well as tuberculin, has been used in a number of different localities. Even as far back as 1933 Wolff<sup>22</sup> recommended the tape test, in which he used an ointment containing the tuberculin and the killed tubercle bacilli in a rather high concentration. The test was read in 48 hours. The positive reaction shows erythema, induration and even papules, whereas in a weak reaction a pale rose color is noted. The height of reaction was found to have occurred in 72 hours. In comparison with the intracutaneous test, he found that the two agreed in 95.8 per cent of the cases. In a later communication<sup>23</sup> Wolff et al reported that using tuberculin ointment they found an agreement of 98.2 per cent with the intracutaneous injection of 0.1 mg. of old tuberculin.

Taylor,<sup>24</sup> in his report on the more modern patch test by Vollmer, states that it has been his observation that the test was actually more sensitive than the Mantoux for the young, but above 50 years it was less so. His comparison with the Mantoux reveals that they were 94.3 per cent in agreement. This test, of course, has the advantage of removing the objection of the needle, and while I have not had any positive experience with the tuberculin patch test, it is said to result in fewer sore arms. However, the other objections to tuberculin testing still hold, and it would seem that, inasmuch as there appears to be a question regarding the variation in the sensitivity of skins, the quantitative character of the Mantoux test is in no way approached by the tuberculin patch test. It would be interesting to see the result of this same test on a number of far-advanced and terminal cases of pulmonary tuberculosis.

It is true that the tuberculin test is of some educational value, but when it is considered that there are many other methods that can educate individuals with greater efficiency and less cost, I do not believe that we should hold on to a method which is obviously going to fall into greater disrepute as time goes on.

### *Possibilities and Advantages of X-ray Examination*

We have gone, in some detail, into the various methods of diagnosing pulmonary tuberculosis under our present system and we find that looking for symptoms and physical signs is a poor method of bringing our batting average up to where it should be.

In minimal tuberculosis Brown and Sampson<sup>25</sup> state that the x-ray is positive in 99 per cent of the cases, a positive sputum is present in 35 per cent, physical signs (rales) in 27 per cent, history of hemoptysis in 26 per cent and a history of pleural effusion in 4 per cent of the cases. Therefore, if it were possible to x-ray every individual at regular intervals, early diagnosis could easily be made, but this has not been economically possible. It is also obvious to everyone in the field that, as time goes on and as fewer and fewer individuals are infected with the disease, more and more x-rays will be taken which will reveal only healed childhood tuberculosis or no tuberculosis at all.

It would seem, however, that x-ray examination should be of value at certain specific periods in the individuals' lives, from physical and economic standpoints. In recent years many states have passed laws requiring a Wassermann test and an examination to prove the absence of gonorrheal infection, prior to marriage. It would appear that this is the logical time to rule out tuberculosis also. The advantages of having an x-ray at this time are many, but we all know that the most susceptible period for tuberculosis is between the ages of 15 and 35 years. It is a period when mortality is at its highest. It would prevent bringing into the world many children who are destined to become orphans at an early age because one or the other of the parents suffered from an unrecognized active tuberculosis. In the interest of society as a whole, this would be an ideal period to gently coerce individuals into having x-rays before assuming the responsibility of caring for a family.

Since it is economically impossible to x-ray everyone, and x-rays must be repeated at intervals in order to be effective, other methods must be used to approach the problem. One of these methods is the fluoroscope, which has been recommended by many investigators.

Knies<sup>15</sup> contends that, whereas there is a 26 per cent error in diagnosis by the tuberculin test alone, the fluoroscope can be said to have a 9.7 per cent error. We previously mentioned the work of Fellows,<sup>26</sup> who by physical examination and fluoroscope was able to pick up a considerable number of minimal cases far earlier than by any other method outside of the x-ray. In 2,603 fluoroscopic examinations made, he reports that there was an error of 13 per cent by the fluoroscope when checked by the x-ray. An analysis of Fellows' cases revealed 76 per cent in the minimal stage and 24 per cent in the moderately and far-advanced stages. Compare this with statistics quoted by Steinberg and Barnard, from the Bellevue-Yorkville Consultation Clinic, in which the percentage of minimal cases is given as 26 per cent, and that of the diagnosing clinic of the Department of Health of the City of New York for 1932, where 29 per cent were found minimal. These clinics, undoubtedly of the highest type, were particularly dependent on symptoms as a method of drawing attention to the disease. Suspicious physical findings noted by the family physician also sent individuals to the clinics. It is obvious that the fluoroscope exceeds, by far, these methods in diagnosing early cases. Most tuberculosis workers agree with Anderson,<sup>25</sup> who states that 50 per cent of minimal cases have no abnormal signs and that the remaining 50 per cent have scant signs of infection.

Francisco<sup>26</sup> in 146,571 fluoroscopies done on large groups of so-called normal individuals, found in 2,004, or 1.4 per cent, evidence of pulmonary tuberculosis. It is significant that 70.2 per cent were classified as minimal.

The advantages of the fluoroscope are:

- 1) Low initial cost of examination.
- 2) The ability to actually visualize the lung tissue where even the x-ray does not penetrate.

The fluoroscope is an inexpensive instrument, compared with the x-ray. The ability to visualize the lung is, of course, important as it has been shown many times that questionable pathology in the circle of the first rib, which is sometimes not as clear in an x-ray due to the interposing scapula, clavicle and ribs, makes the diagnosis obscure. By fluoroscoping the patient, rotating the scapula, raising or depressing the clavicle, a

clearer visualization may be obtained, which would otherwise require still more x-rays to make clear. Rotation of the patient also demonstrates presence of pathology hidden behind the cardiac shadow, and cavities are sometimes discovered in the cardio-hepatic angle.

The disadvantages of the fluoroscope are:

1) The human element is predominantly important, in that the findings are the impression of one individual.

2) Considerable amount of experience with the fluoroscope should be had before one can be certain of the various markings which are normally present.

3) As with the x-ray, the thickness of the patient, on occasions, will make the diagnosis somewhat more difficult.

4) No permanent record is kept of what was actually seen, but merely the impression of the fluoroscopist.

5) There is no method of comparing serially the chest from one time to the next and small changes might be forgotten by the observer.

Considering, however, the difference in error by other methods and their availability, we can heartily concur with Knies<sup>15</sup> in his statement: "On the whole, in experienced hands and with adequate equipment, fluoroscopy appears to be a thorough and dependable method of radiological chest examination." Where there is any suspicion at all in the mind of the fluoroscopist, it is, of course, always better to x-ray. In our institution we have been able to pick up lesions by the fluoroscope that were less than one centimeter in diameter and where there were no physical signs or symptoms of the disease present. Fluoroscopic examination of contacts before x-raying has saved many films from needless use.

Several investigators have recommended the combined use of the fluoroscope and the x-ray; and this would appear to be a method worthy of consideration in locating early cases of pulmonary tuberculosis at a fairly low rate of cost per case. School children are first tuberculin tested, the positive reactors are fluoroscoped and x-rays are made of those who are at all suspicious. This would cut down the number of films usually used and the remainder of the program could then be carried out more inexpensively. Following the tuberculin testing of the children, it is then

recommended that in all families in which there are positive reactors the adults in contact be fluoroscoped and the suspicious cases radiographed.

Weber, Murphy and Holcomb<sup>27</sup> attempted such a procedure realizing that the x-raying of large groups of children quite often leads, in the end, to very few cases of significant pulmonary tuberculosis. In Ulster County, New York, 742 children were tuberculin tested and 238 reactors found. These individuals were x-rayed and one active case of the disease discovered (which is about the result of the average tuberculin-x-ray survey). From October, 1933, to May, 1934, they attempted to put the plan mentioned above into operation. A group of 1,362 high school students were Mantoux-tested and 32.7 per cent were positive. Of 3,596 grade school pupils tested 14.5 per cent were positive reactors. A group of 410 of the 446 positive high school reactors (92 per cent) were fluoroscoped, as well as 393 grade school pupils. Ninety-nine or 12 per cent of these 803 pupils had suspicious fluoroscopic findings and were x-rayed. The findings were as follows:

Minimal tuberculosis .....	4 cases
Moderately-advanced tuberculosis .....	3 cases
Far-advanced tuberculosis .....	1 case
Calcifications .....	19 cases
Suspicious .....	8 cases
Other conditions .....	5 cases

The parents of these positive reactors were then fluoroscoped, these being divided into two groups; viz. (1) families completely examined, 217; (2) families partially examined (one adult member seen), 104 families. A total of 537 individuals were seen and fluoroscoped, sixty-four of these, or 12 per cent, being considered suspicious enough to x-ray. Including the children, a total of 1,340 individuals were fluoroscopically examined and 163 x-rays were taken. The grand results of these tests were as follows:

Minimal tuberculosis .....	15 cases
Moderately advanced .....	12 cases
Far advanced .....	1 case
Suspicious .....	15 cases
Other conditions .....	21 cases

The total cost in this series, not including the tuberculin, which in many cases is furnished free by the Department of Health, was

\$182.25, averaging a cost of \$6.50, which compares favorably with the \$450.00 per case mentioned by Dr. Tice previously, in the old method of tuberculin-testing.

Another method worthy of consideration in the roentgenological study of large groups of individuals is the paper film advocated by Dr. J. Arthur Myers, who has used it at the Lymanhurst Health Center in Minneapolis for the last 7 years, and who is very enthusiastic regarding its possibilities. In a personal communication to the author Dr. Myers states: "We did quite a large series of examinations with both paper film and celluloid film simultaneously, and were unable to find anything on the celluloid film that was not distinctly visible on paper film."

In an article by Dr. Myers<sup>28</sup> entitled "Value and Limitations of X-ray in the Diagnosis of Chest Diseases," he aptly defends the paper film. Of 1,075 students examined by paper x-ray, 50 of whom were known to have definite disease of the chest, since they had had stereoscopic studies previously, not one lesion was missed by the paper film, although many of these were minimal. He argues that, whereas fluoroscopy was adequate in screening out 95 per cent of tuberculosis, it is better to use the paper x-ray, which he feels is considerably more efficient than fluoroscopy and cheaper than celluloid x-rays. He admits that small shadows have been overlooked on the paper film but this has also occurred on the celluloid film and he believes definite lesions will be visible on both the celluloid and the paper film.

The New York Health Department has examined by paper film more than 200,000 persons and is apparently quite satisfied with this method of examining.

Entering into the picture is the new method of the miniature film which is done by two different methods. One is the use of a special fluorescent screen. Opposite the screen is placed a 35-millimeter camera with a F 1.5 lens, and a small picture is taken of the screen. After developing this 1x1½-inch picture it is then projected to whatever size is desired. The other method consists of using a large lens of approximately the same capacity to make a picture of the fluoroscopic image 4x5 inches in size. This apparatus is being manufactured by the General Electric X-Ray Corporation.

Bridges,<sup>29</sup> using the 4x5 picture, shows that this method combines the advantages of the x-ray with the economy of the fluoroscope. Another important factor is the small filing space necessary. He estimated that the error in diagnosis in all types of cases of significant pulmonary tuberculosis is 0.77 of 1 per cent. This method, therefore, appears to be quite worthwhile at the present time, although it is not the last word to be said on the subject. The 35-millimeter camera method also has great possibilities and it is believed that at least one of the large x-ray companies is working on a unit employing this method.

Douglas and Birkelo<sup>18</sup> examined a large series of individuals by the 14x17 x-ray film. They discovered 271 cases of tuberculosis. This same group was re-x-rayed by the miniature film and it was found that 5 cases were missed entirely and 5 cases were called other degrees of tuberculosis than were revealed by the larger plate. The total error according to these authorities was 2.6 per cent, and they believe that with greater familiarity a smaller percentage of error will result, inasmuch as this method of diagnosing has only been on the market a relatively short time.

It has the advantage of:

- 1) Speed (73 persons were examined in 65 minutes).
- 2) Cost (which is approximately 1/10 of the regular film), 10 or 11 cents per plate.
- 3) Simplification of the problem of handling, filing and storing ((33 per cent of the regular space necessary for the 14x17 film).

The results of their examination of 1,425 women, who were examined by tuberculin test and by the miniature film, were given before. It is probable that this method will be used more and more in large surveys of so-called normal individuals. It is realized, of course, that, as the authors have observed, this film can never be used as a substitute for the larger size. They are, however, useful in survey work where large numbers of pictures must be taken.

#### *Summary and Conclusions*

A. Summing up this entire paper we may say that the methods of diagnosing tuberculosis at the present time are:

- 1) The patient-physician relationship in which, because an individual suffers with symptoms, he consults a physician and is ex-

amined by him. Provided that suspicion is sufficiently aroused, an x-ray is taken.

2) The work of sanatoria and Public Health officials, Tuberculosis Associations, private physicians and local groups, among contacts. These workers realize that from 15 to 30 times as much tuberculosis is found among individuals who are in direct contact with a tuberculous person as in the general population. Examination of contacts is usually done by means of the x-ray. Some few still cling to the idea that tuberculin tests should be made first and those that are positive be x-rayed. Many authorities now agree that the x-ray is the only safe method to depend on, regardless of the tuberculin reaction, particularly in adults.

3) X-ray studies of the chests of normal individuals at various times during life, such as, before obtaining employment, at the time of marriage, before undergoing long educational careers, during the high school years and on entering and leaving college.

4) Tuberculin testing, which is responsible for approximately 5 to 10 per cent of the cases in sanatoria being brought to light.

B. We have shown the relative inefficiency of the physical examination and of symptoms in either leading us to the diagnosis or in clinching the diagnosis. *Where the findings are negative, little or no reliance can be placed upon either of these factors.*

C. The expensive and questionable wholesale tuberculin-testing of school children, with subsequent x-raying, without adequate investigation of the contacts which these children make, is to be looked upon as digging for lead when gold lies on top of the ground.

D. The 99 per cent efficiency in minimal cases and the almost 100 per cent efficiency in moderately and far-advanced cases, make the x-ray the chief instrument of diagnosis. We realize that the practical disadvantage of high cost prohibits large scale application to the point where it is an efficient weapon in locating the disease. From the public health standpoint, consideration should be given to the combination of tuberculin testing the children and their contacts, together with the x-raying of those whose chests appear suspicious of active infection by fluoroscope.

Lastly, the more widespread the use of the x-ray is made economically possible by means of the paper film and miniature celluloid

film.

In conclusion, as Dr. J. Arthur Myers has stated so ably, "Therefore, in arriving at final diagnoses of diseases of the chest, we must constantly keep in mind that no single phase of the examination is adequate. While the x-ray is of great value in locating lesions, it remains just one part of an examination of which there are many important parts. The final diagnosis in many cases is reached only when one has brought together *all* available evidence so that the clinical picture of the disease is complete." It is obvious that no one test or group of tests now available can make the diagnosis 100 per cent certain. Until such a time arrives that a test is devised which is 100 per cent infallible, every factor must be considered as a facet in the jewel which makes the diagnosis. Until more skepticism is evinced toward negative findings of the physical examination and the tuberculin test, and greater reliance is placed upon the fluoroscope, the miniature x-ray films and the standard x-ray, there will be little change in the dark picture of late cases entering the sanatorium.

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## Organization News

### SECOND ANNUAL MEETING PENNSYLVANIA CHAPTER

The Pennsylvania Chapter of the College will meet at the Wm. Penn Hotel, Pittsburgh, on October 4 and 5, 1942. The following program has been arranged:

*Sunday, October 4th*  
5:00 P. M.

General business—Committee reports

Election of Officers

6:30 P. M.

Social Hour—Beverages

7:00 P. M.

Banquet (informal)

Guest Speaker

Dr. J. Winthrop Peabody

President of the American College of Chest Physicians

### SCIENTIFIC MEETING

*Monday, October 5th*  
9:30 A. M.

Management of Pulmonary Tuberculosis in the Rejected Draftee

Dr. C. Howard Marcy, Pittsburgh, Pa.

Discussion

Dr. Nelson Mercer, Philadelphia, Pa.

10:15 A. M.

The Role of Fluoroscopic Guidance in the Diagnosis and Treatment of Thoracic Diseases

Dr. Louis Cohen, Philadelphia, Pa.

Discussion

Dr. V. Leffingwell, Sharon, Pa.

11:00 A. M.

Information Please—Pulmonary Tuberculosis  
Your questions will be answered

12:00 Noon

Luncheon

The officers of the Pennsylvania Chapter are:  
R. S. Anderson, M.D., Erie, *President*; Harry J. Treshler, M.D., Cresson, *Vice-President*; Edward Lebovitz, M.D., Pittsburgh, *Secretary-Treasurer*.

### PRESIDENT-ELECT HONORED

The Illinois Chapter of the American College of Chest Physicians sponsored a dinner in honor of Dr. Jay Arthur Myers, Minneapolis, President-Elect of the College. The dinner was held at the Edgewater Beach Hotel, Chicago, September 16. Forty-two members of the College from the Mississippi Valley states attended the dinner.

Dr. Robert K. Campbell, Governor of the College for Illinois, presided and introduced the following officials of the College, who made brief talks:

Dr. Fred M. Meixner, Peoria, former Regent and President of the Illinois Tuberculosis Association;

Dr. Merlin H. Draper, Fort Wayne, Indiana, President, Indiana Chapter;

Dr. James H. Stygall, Indianapolis, Regent for the District;

Dr. G. Arvid Hedberg, Nopeming, Governor for Minnesota;

Dr. Sidney A. Slater, Worthington, former Governor for Minnesota;

Dr. Carl O. Schaefer, Racine, Governor for Wisconsin.

Dr. Joseph C. Placak, Chairman of the Board of Regents of the College, spoke on the progress the College had made and he placed emphasis on the large number of members who are serving with the Armed Forces of our country.

Dr. Jay Arthur Myers gave an interesting talk which has been condensed and is published in this issue of the Journal as an editorial.

Dr. Otto C. Schlack, Oak Forest, Illinois, was Chairman of the Reception Committee and he introduced Dr. Hugh A. Beam, President of the Illinois Chapter of the College, who turned the meeting over to Dr. Campbell, the Toastmaster.

### NEWSNOTE

Dr. Joseph E. J. Harris, Albuquerque, New Mexico, a Fellow of the College, was chosen President-Elect of the New Mexico Medical Society at their annual meeting in June.

## MICHIGAN CHAPTER MEETS

The Fall meeting of the Michigan Chapter of the American College of Chest Physicians was held at the Pantlind Hotel, Grand Rapids, September 22, 1942. The following program was presented:

## AFTERNOON SESSION

2:30 P. M.

Norman Clarke, M.D., *Presiding*  
End Results in 100 Pneumothorax Cases  
Paul Chapman, M.D.

Bronchoscopic Examination as an Aid in the  
Early Diagnosis of Cancer of the Lung  
John R. Burch, M.D.

Diagnostic Importance of Pleural Effusions in  
Cancer of the Lung  
William P. Chester, M.D.

Cardio Pulmonary Disease  
Leslie F. Colvin, M.D.

6:30 P. M.

DINNER MEETING  
(Informal)

William A. Hudson, M.D., *Master of Ceremonies*  
Physiology of Respiration  
Kenneth A. Wood, M.D.

General Discussion of Thoracic Trauma  
Jerome R. Head, M.D., Chicago, Illinois

The officers of the Michigan Chapter are: Willard B. Howes, M.D., *President*; Stephen M. Gelenger, M.D., *Vice President*; Donald F. MacInnis, M.D., *Secretary-Treasurer*.

## NEW JERSEY CHAPTER MEETS

The Fall meeting of the New Jersey Chapter of the American College of Chest Physicians was held at the Bergen Pines Sanatorium, Ridgewood, New Jersey, September 25, 1942, at 2:00 P. M. The following program was presented:

Dr. Joseph R. Morrow, President, New Jersey Chapter, *Presiding*

Address of Welcome  
Dr. George M. Levitas, Member, Board of Managers, Bergen Pines

Aims of the American College of Chest Physicians

Dr. J. Winthrop Peabody, President, American College of Chest Physicians

Medical Military Objectives  
Lieut.-Col. Esmond R. Long, Office of the Surgeon General, U. S. Army, Washington, D. C.

## Symposium

Dr. J. Edward Bennett, Attending Roentgenologist, Bergen Pines, New Jersey

The officers of the New Jersey Chapter are: Dr. Joseph R. Morrow, *President*; Dr. Clyde M. Fish, *Vice-President*; Dr. Irving Willner, *Secretary-Treasurer*.

## INDIANA CHAPTER MEETS

The annual meeting of the Indiana Chapter of the American College of Chest Physicians was held in conjunction with the meeting of the Indiana State Medical Society at French Lick, Indiana, September 29. The meeting was held jointly with the members of the state and county anti-tuberculosis committees of the Indiana State Medical Association, and the following program was presented by the Indiana Chapter of the College:

## Luncheon Meeting

Pitfalls in Pneumothorax Treatments  
Dr. Paul A. Turner, Louisville, Kentucky, Superintendent, State Sanatorium.

Reinfection Tuberculosis in Younger Children  
Dr. James H. Stygall, Indianapolis.

Results of Pectin-Agar Feeding in Gastro-Intestinal Tuberculosis  
Dr. Paul D. Crimm, Evansville.

X-Ray Conference  
Dr. J. V. Pace, New Albany, Chairman.

The officers of the Indiana Chapter of the College are: Dr. Merlin H. Draper, Fort Wayne, *President*; Dr. James S. McBride, Indianapolis, *Vice-President*; Dr. Thomas R. Owens, Muncie, *Secretary-Treasurer*. The members of the Anti-Tuberculosis Committee of the state medical society are: Dr. James H. Stygall, Indianapolis, Chairman; Dr. J. V. Pace, New Albany; Dr. Robert Staff, Rockville; Dr. P. D. Crimm, Evansville; Dr. S. R. Combs, Terre Haute; Dr. J. S. McBride, Indianapolis; Dr. M. H. Draper, Fort Wayne; Dr. P. H. Becker, Crown Point.

BRAZILIAN CHAPTER OF COLLEGE  
TO BE ORGANIZED

Dr. Affonso Mac-Dowell, Rio de Janeiro, Governor of the College for Brazil, has approved the following physicians as Fellows and Associate Members of the American College of Chest Physicians:

## Fellows

Dr. Clemente Ferreira, Sao Paulo  
Dr. Samuel Libanio, Botafogo, Rio de Janeiro, D. F.  
Dr. Aresky Amorim, Copacabana, Rio de Janeiro  
Dr. Reginaldo Fernandes, Copacabana, Rio de Janeiro, D. F.

## Associate Members

Dr. Epilogo de Campos, Belem (Para)  
Dr. Olimpio Gomes, Botafogo, Rio de Janeiro, D. F.  
Dr. Ari Brasil, Rio de Janeiro, D. F.  
Dr. Paulo Marchese, Urca, Rio de Janeiro, D. F.  
Dr. Joao Otavio Lobo, Fortaleza (Ceara)  
Dr. Gaspar Faria, Porto Alegre (Rio Grande do Sul)  
Dr. Jose Silveira, Salvador (Baia)  
Dr. Roberto Pereira, Laranjeiras Rio de Janeiro, D. F.  
Dr. Agenor de Souza Bomfim, Recife (Pernambuco)  
Dr. J. Coriolano de Carvalho, Marilia (Est. S. Paulo)  
Dr. Galdino Travassos, Rio de Janeiro, D. F.  
Dr. Joao Martins Castello Branco, Tijuca, Rio de Janeiro, D. F.  
Dr. Abrahao Serebrenick, Rio de Janeiro, D. F.  
Dr. Jose Carvalho Ferreira, Rio de Janeiro, D. F.  
Dr. Henri Eugene Jouval, Rio de Janeiro, D. F.  
Dr. Joao da Silva Vigella, Niteroi (Est. do Rio)  
Dr. Jaime dos Santos Neves, Vitoria (Espirito Santo)  
Dr. Luis Arantes de Almeida, Rio de Janeiro, D. F.  
Dr. Alfonso MacDowell Filho, Rio de Janeiro, D. F.

Dr. MacDowell has notified the Executive Offices of the College that a Chapter of the American College of Chest Physicians will be organized in Brazil. The officers of the Chapter will be announced in a future issue of the journal.

# **Council and Committees of the American College of Chest Physicians**

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	<i>Term Ending</i>
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Herman E. Hilleboe, M. D. Washington, D. C.	1944
Brigadier General S. U. Marietta Washington, D. C.	1945
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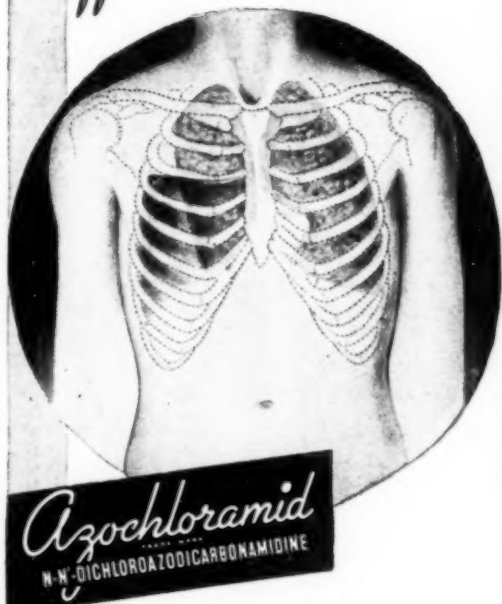
- George G. Ornstein, *Chairman*  
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*United States Army*

- Major Roscoe E. Avery, Barre, Vermont, stationed at Fort Sam Houston, Texas.  
Major Gerald A. Beatty, Wilmington, Delaware, stationed at 15th Field Hospital, Camp Bowie, Texas.  
Major Oscar Blitz, New Orleans, Louisiana, stationed at Station Hospital, Fort Benning, Georgia.  
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## OBITUARY

JULIUS PETER DWORETZKY  
1885-1942

Dr. Dworetzky was born in Lida, Russia, December 24, 1885, and died in Liberty, New York, April 20, 1942. He was graduated in medicine from the Long Island College Hospital in 1940 and was a Fellow of the American College of Chest Physicians.

Dr. Dworetzky was director of medicine at the Municipal Sanatorium at Otisville; consulting physician to the Elizabeth A. Horton Memorial Hospital at Middletown, St. Clare's Hospital in New York City, St. Francis Hospital at Port Jervis, Ulster County Tuberculosis Hospital at Kingston, and medical examiner to the Veterans Bureau. He was a Fellow of the American Medical Association, a diplomate of the American Board of Internal Medicine, a diplomate of the American Board of Otolaryngology and a member of the American Laryngological, Rhinological and Otolological Society, and the state and county medical societies.

During the world war I, Dr. Dworetzky served in France as a Captain of the American Red Cross with the Rockefeller Tuberculosis Commission.

Dr. Dworetzky made several original contributions to literature in the field of tuberculosis of the larynx.

Jas S. Edlin, M.D.  
New York, N. Y.

## ERRATUM

Dr. Frank G. Seligson, formerly of Glencliff, New Hampshire, a Fellow of the College, has been appointed medical superintendent of the Edward Sanatorium, Naperville, Illinois. This is to correct a notice which formerly appeared in the journal.

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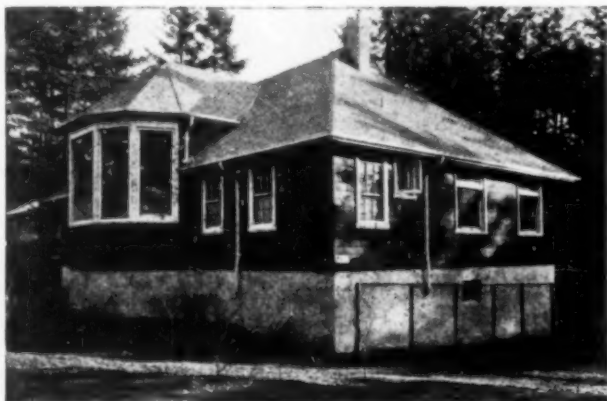
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